1. Solve the simultaneous equations

$$x^2 + (y)^2 = 29 \quad ①$$

$$y - x = 3$$

$$y = 3 + x$$

sub $y = 3 + x$ into ①

$$x^2 + (3+x)^2 = 29$$

$$x^2 + 9 + 3x + 3x + x^2 = 29$$

$$2x^2 + 6x - 20 = 0$$

$$x^2 + 3x - 10 = 0$$

$$(x+5)(x-2) = 0$$

$$x = -5 \qquad x = 2$$

$$y = 3 + (-5) \qquad y = 3 + (2)$$

$$= -2 \qquad = 5$$

$x = -5$ and $y = -2$ or $x = 2$ and $y = 5$

(Total 7 marks)

2. Bill said that the line $y = 6$ cuts the curve $x^2 + y^2 = 25$ at two points.

(a) By eliminating y show that Bill is incorrect.

$$x^2 + (6)^2 = 25$$
$$x^2 + 36 = 25$$
$$x^2 = -11$$

There are no solutions. (You can not square root a negative number)

(2)

(b) By eliminating y, find the solutions to the simultaneous equations

$$x^2 + y^2 = 25$$

$$y = 2x - 2$$

$$x^2 + (2x-2)^2 = 25$$

$$x^2 + 4x^2 - 4x - 4x + 4 = 25$$

$$5x^2 - 8x - 21 = 0$$

$$(5x + 7)(x - 3) = 0$$

$$x = -\frac{7}{5} \qquad x = 3$$

$$y = 2\left(-\frac{7}{5}\right) - 2 \qquad y = 2(3) - 2$$

$$= -\frac{14}{5} - 2 \qquad y = 6 - 2$$

$$= -\frac{24}{5} \qquad = 4$$

$x = $ ......$-7/5$...... $y = $ ......$-24/5$......

or $x = $ ......3...... $y = $ ......4......

(6)

(Total 8 marks)

3. By eliminating y, find the solutions to the simultaneous equations

$$x^2 + y^2 = 25$$
$$y = x - 7$$

$$x^2 + (x-7)^2 = 25$$

$$x^2 + x^2 - 7x - 7x + 49 = 25$$

$$2x^2 - 14x + 24 = 0$$

$$x^2 - 7x + 12 = 0$$

$$(x-3)(x-4) = 0$$

$$x = 3 \qquad x = 4$$

$$y = (3) - 7 \qquad y = (4) - 7$$

$$= -4 \qquad = -3$$

$x = $ ....3........ $y = $ ....-4........

or $x = $ ....4........ $y = $ ....-3........

(Total 6 marks)

4. By eliminating y, find the solutions to the simultaneous equations

$$y - 2x = 3 \qquad y = 2x + 3$$

$$x^2 + y^2 = 18$$

$$x^2 + (2x+3)^2 = 18$$

$$x^2 + 4x^2 + 6x + 6x + 9 = 18$$

$$5x^2 + 12x - 9 = 0$$

$$(5x - 3)(x + 3) = 0$$

$$x = \frac{3}{5} \qquad x = -3$$

$$y = 2\left(\frac{3}{5}\right) + 3 \qquad y = 2(-3) + 3$$

$$= \frac{6}{5} + 3 \qquad y = -6 + 3$$

$$= \frac{21}{5} \qquad = -3$$

$$x = \ldots \frac{3}{5} \ldots \qquad y = \ldots 2\frac{1}{5} \ldots$$

$$\text{or } x = \ldots -3 \ldots \qquad y = \ldots -3 \ldots$$

(Total 7 marks)

5. Solve the simultaneous equations

$$x^2 + y^2 = 5$$

$$y = 3x + 1$$

$$x^2 + (3x+1)^2 = 5$$

$$x^2 + 9x^2 + 6x + 1 = 5$$

$$10x^2 + 6x - 4 = 0$$

$$5x^2 + 3x - 2 = 0$$

$$(5x - 2)(x + 1) = 0$$

$$x = \frac{2}{5} \qquad x = -1$$

$$y = 3\left(\frac{2}{5}\right) + 1 \qquad y = 3(-1) + 1$$

$$= \frac{6}{5} + 1 \qquad = -3 + 1$$

$$= \frac{11}{5} \qquad = -2$$

$x = $ ...... $\frac{2}{5}$ ...... $y = $ ...... $\frac{11}{5}$ ......

or $x = $ ...... -1 ...... $y = $ ...... -2 ......

(Total 6 marks)

6.   Solve the simultaneous equations

$x + y = 4$ $y = 4 - x$

$x^2 + y^2 = 40$

$$x^2 + (4 - x)^2 = 40$$

$$x^2 + 16 - 8x + x^2 = 40$$

$$2x^2 - 8x - 24 = 0$$

$$x^2 - 4x - 12 = 0$$

$$(x - 6)(x + 2) = 0$$

$$x = 6 \qquad x = -2.$$

$$y = -2 \qquad y = 6$$

$x = \underline{\quad 6 \quad}, y = \underline{\quad -2 \quad}$

or

$x = \underline{\quad -2 \quad}, y = \underline{\quad 6 \quad}$

(Total 7 marks)

7. By eliminating x, find the solutions to the simultaneous equations

$$x - 2y = 1$$
$$x^2 + y^2 = 13$$

$x = 2y + 1$

$(2y+1)^2 + y^2 = 13$

$4y^2 + 4y + 1 + y^2 = 13$

$5y^2 + 4y - 12 = 0$

$(5y - 6)(y + 2) = 0$

$y = \frac{6}{5}$ $y = -2$

$x = 2\left(\frac{6}{5}\right) + 1$ $x = 2(-2) + 1$

$= \frac{12}{5} + 1$ $= -4 + 1$

$= \frac{17}{5}$ $= -3$

$x = \underline{17/5}$, $y = \underline{6/5}$

or $x = \underline{-3}$, $y = \underline{-2}$

(Total 7 marks)